I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO: COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450, ON THE DATE INDICATED BELOW.

BY: Renee Conto Date: April 20, 2005

MAIL STOP RCE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: Kazuhito HATOH, et al.		
Conf. No.: 8925	Group Art Unit:	1746
Appln. No.: 09/719,526	Examiner:	Jonathan Crepeau
Filing Date: December 13, 2000	Attorney Docket No.:	10059-368US(P20815-01)
Title: POLYMER ELECTROLYTE FUEL CELL		

DECLARATION OF KAZUHITO HATOH UNDER 37 C.F.R. § 1.132

I, Kazuhito Hatoh, declare and state as follows:

1. I am one of the co-inventors of the above-identified patent application and am an employee of Matsushita Electric Industrial Co., Ltd., the Assignee of the above-identified patent application.

2. I received a Master's Degree in Graduate School of Engineering of Hiroshima University in March 1985. Since April 1985 I have been employed as an engineer in a unit of Matsushita Electric Industrial Co., Ltd., where I have been engaged in the research and development of fuel cells.

3. I am familiar with the prosecution of the above application in the U.S. Patent and Trademark Office. In particular, I am aware of the Examiner's position in the Office Action dated August 16, 2004 that the thickness of the polymer electrolyte membrane is recognized by the prior art as being a result-effective variable and that the discovery of an optimum value of a result-effective variable in a known process is ordinarily within the skill of the art. I am also aware of the Examiner's contention that U.S. Patent 5,284,718 of Chow et al. renders the claimed membrane thickness obvious, because Chow et al. discusses the merits of a thinner membrane, which would have motivated the artisan to make the membrane thinner than 89 μm,

and further that Chow et al. teaches that membranes used in the fuel cells and membranes used in the humidifiers are substantially identical.

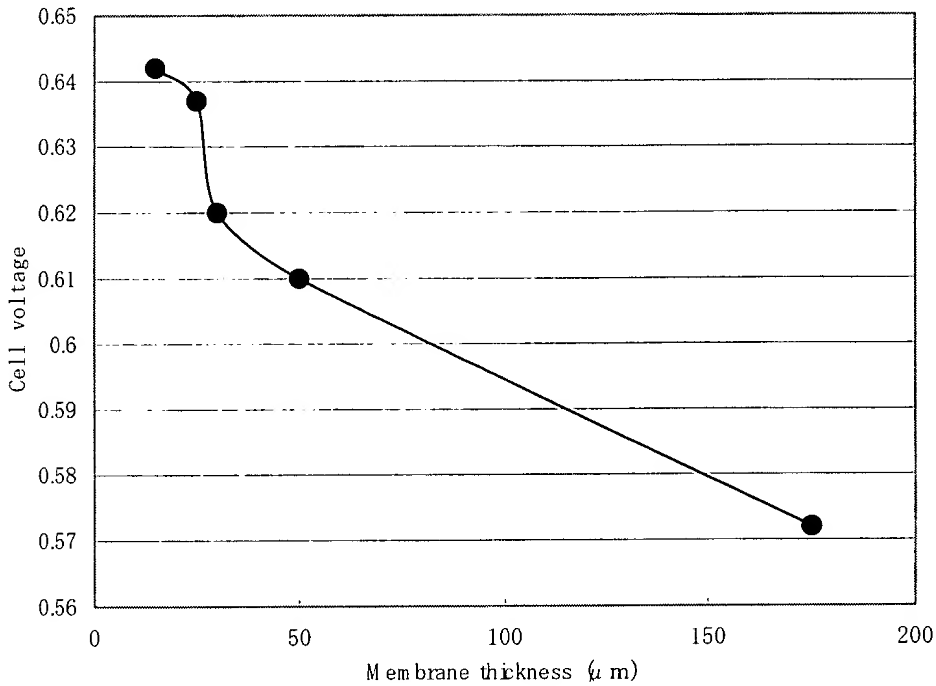
4. In order to demonstrate the criticality of the thickness of the second (unit humidifier) polymer electrolyte membrane and the unexpected results obtained by this second polymer electrolyte membrane having a thickness not exceeding about 50 μm, and preferably not exceeding 25 μm, the following experiments were carried out under my supervision and direction:

EXPERIMENT 1

A fuel cell stack (laminated battery) was produced having an internal humidifier (total heat exchanger) according to Example 1 described in the specification of the present application. However, the fuel cell stack was produced by laminating 50 unit cells in 50 layers, not 100 unit cells in 100 layers as incorrectly stated in Example 1 of the specification (page 12 of the application). One skilled in the art would recognize from the conditions of fuel utilization, oxygen utilization and current density described in Example 1 that 31V (page 13, line 16) is the correct total voltage for a 50 unit cell, not a 100 unit cell.

The fuel cell was put through an electric power generation test by supplying hydrogen to the anode and air to the cathode under conditions of a battery temperature of 75°C, a hydrogen utilization rate of 80%, an oxygen utilization rate of 40% and a current density of 0.7 A/cm^2. The results obtained from the electric power generation test are shown below in GRAPH 1. GRAPH 1 shows the correlation between the initial battery voltage (V) per unit cell (i.e., about 31-32V for the entire 50 unit stack) and the thickness (μm) of the second polymer electrolyte membrane within the internal humidifier.

GRAPH 1

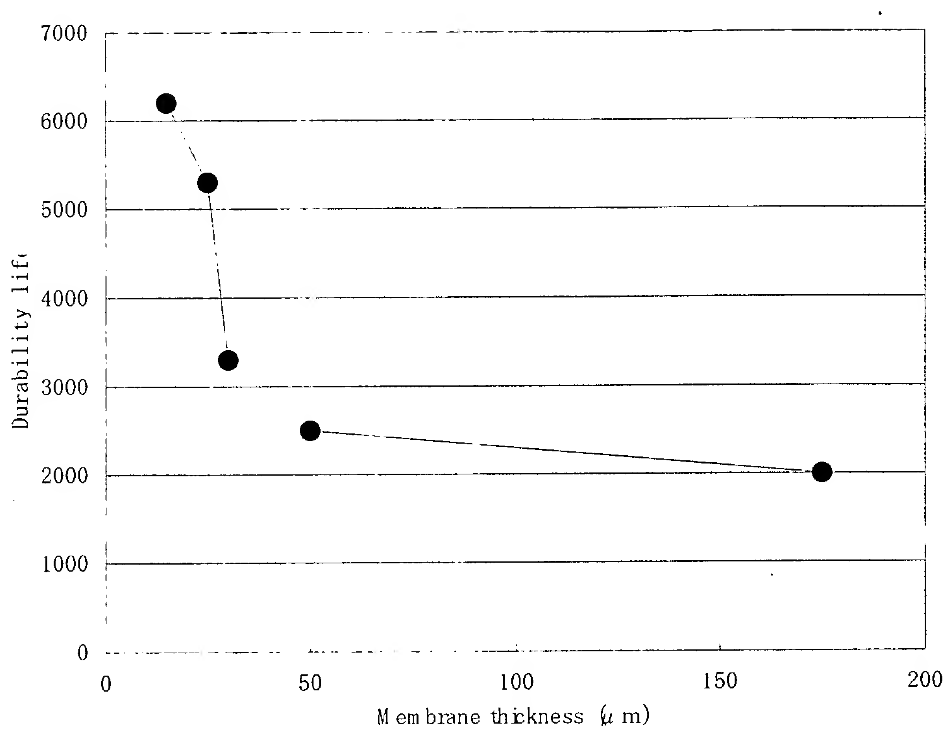


EXPERIMENT 2

A fuel cell stack (laminated battery) was produced having an internal humidifier (total heat exchanger) according to Example 1 described in the specification of the present application. However, as in Experiment 1 above, the fuel cell stack was produced by laminating 50 unit cells in 50 layers.

The fuel cell was put through an electric power generation test by supplying hydrogen to the anode and air to the cathode under conditions of a battery temperature of 75°C, a hydrogen utilization rate of 80%, an oxygen utilization rate of 40% and a current density of 0.7 A/cm^2. The time expended in hours (h) until the battery voltage had decreased to 90% of the initial battery voltage was measured, which is referred to as "durability life". GRAPH 2 below shows the correlation between the durability life (h) and the thickness (μm) of the second polymer electrolyte membrane within the internal humidifier.

GRAPH 2



5. As seen from the above GRAPHs 1 and 2, if the thickness of the second polymer electrolyte membrane in the unit humidifier inside the end plates disposed on the ends of the fuel cell stack is about 50 μm or below, total heat exchanging efficiency is improved and dew points of the supplied gases increase to raise cell performances (cell voltage and durability life). The cell voltage and durability life are further considerably improved when the polymer electrolyte membrane thickness of the unit humidifier is further reduced to about 25 μm or below.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that those statements were made with the knowledge that willful false statements the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

12, April, 2005
Date

Kazuhito Hatoh
Kazuhito Hatoh